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The Selection and Seeding of Grasses and Legumes in Alberta

by

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and

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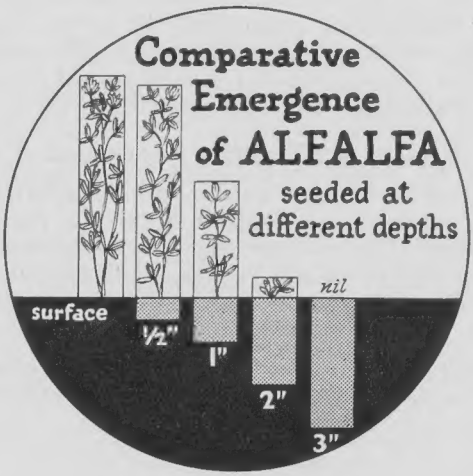

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Selection and Seeding of Grasses and Legumes in Alberta

By R. E. ENGLISH and H. J. MATHER

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INTRODUCTION

The production of cultivated grasses and legumes for hay and pasture, is rapidly increasing in all parts of the province. The restrictions placed on the marketing of wheat, the scarcity of farm labour and production equipment, and the relatively good prices being paid for live stock, combine to make the seeding of these crops both necessary and profitable. Moreover, associated with this development there is a growing tendency, especially in the grey wooded soils area, to plan permanent farm rotations in which forage crops are included.

Greater emphasis on the production of forage crops has brought about a demand for information with respect to adaptation of the different species and methods of production in the various soils and agricultural regions of the Province.

This circular treats only the selection and seeding of grasses and legumes; but a note has been added dealing with the use of fertilizers in connction with their production on grey wooded soils. The maintenance of yields, grazing and haying practices, and the production of seed are all becoming increasingly important. However, discussion on these points must be left to subsequent publications. For such information as may be required in the meantime, farmers are asked to consult one of the agricultural institutions which is at their service.

Grasses and Legumes Recommended

No single grass or legume can be recommended as definitely the best for all purposes in any particular agricultural region. Each specie has a range of adaptation and use which overlaps with those of other species. Because their moisture requirements are more definite, however, legumes are more restricted in range of adaptation than are the grasses.

The following tabulation sets out the chief characteristics and adaptations of the common grasses and legumes recommended for Alberta:

LEGUMES

Species	Adaptation	Root System	Uses*	Rate of Seeding: Lbs. per acre	Stage to cut for hay
Alfalfa	Wide Adaptation Prefers moist but well drained soils.	Branching tap.	Hay; Pasture Mixtures	8 to 10	1/10 to ½ bloom
Red Clover (Altaswede)	Short Rotations Grey-wooded and black soils	Branching tap.	Hay	7-8	Full bloom
Sweet Clover	Wide adaptation; alkali resistant	Tap	Hay and pasture	8-12	Bud stage
Alsike	Low lands and areas subject to flooding.	Branching tap.	Hay and pasture mixtures	5-6	Full bloom

GRASSES

Species	Adaptation	Root System	Uses*	Rate of Seeding: Lbs. per acre	Stage to cut for hay
Brome	Widely adapted as to soil moisture conditions. Makes good growth throughout summer.	Creeping fibrous	Hay and pasture	10 to 12	Early heading.
Crested-Wheat	Dry open plains. Sandy soils in humid area. Early spring and late fall growth.	Bunch grass; densely fibrous.	Hay and pasture	6 to 10	Early heading
Timothy	Rich moist soils, and cool temperatures. Not alkali resistant. Short duration.	Bunch grass; fibrous.	Hay and pasture mixtures	5 to 6	Blossom
Slender Wheat	Moist to dry lands, alkali resistant. Short duration.	Bunch grass; fibrous.	Hay mixtures	10-12	Early heading
Kentucky Blue	Prefers abundant moisture. Makes heaviest growth in spring and fall.	Creeping; fibrous.	Pasture	5 to 6	
Creeping Red Fescue	Greater adaptability to dry conditions than Kentucky Blue.	Creeping; fibrous.	Pasture	6-8	
Reed Canary	Low areas with high water table.	Creeping; fibrous.	Hay and pasture	6-8	Before heading
Red Top	Wet acid soils; not alkali resistant.	Creeping; fibrous.	Hay; Pasture mixtures	4-6	Fully headed

***Mixtures are mentioned in this tabulation only in the case of species which it is definitely recommended should not be seeded alone.**

Considering production and feeding value, alfalfa must be rated the peer of all forage crops. Alfalfa will not withstand excessive moisture, but will do as well as any other legume under dry conditions. All legumes do especially well on our grey-wooded soils. Alsike is especially adapted on heavy soils and withstands flooding. Sweet clover, being a biennial, can be used only in a short rotation.

Brome is the most widely adapted grass, but it prefers moderate to moist conditions Crested wheat is recommended in the south-east part of the Province, and timothy in areas receiving plenty of moisture. The popularity of slended wheat grass has declined rapidly in late years, but should be used where alkali resistance is required. It will be noted that other grasses included in the tabulation have special adaptations.

Grass and Legume Mixtures

In selecting crops for hay or pasture, grasses and legumes should be chosen that are suitable for seeding in mixtures. Properly inoculated legumes in the mixture increase the value and quantity of feed produced and through the addition of nitrogen to the soil maintain soil fertility.

Grasses in the mixture fill the soil with desirable root fibre, provide a combination for hay that is easier to cure than legumes alone, and, when in pastures, reduce the danger of loss in live stock through bloating.

Set out below are a few examples which indicate the grasses and legumes that mix or do well together. It should be pointed out, however, that the table is intended merely as a guide. To meet special conditions or requirements it is frequently advisable to make up combinations of mixtures which it would be impossible to give in detail. The table on characteristics and adaptation which is given above should be consulted.

Recommended for Pasture

(In the tabulation below the quantity of seed indicated, is the amount of each kind it is recommended should be seeded per acre.)

1.	Alfalfa—3 lbs. Brome—7 lbs.	For permanent pasture, recommended for all but the driest parts of the Province. The proportion of alfalfa is low to reduce danger of bloating in live stock, but is sufficient to prevent development of sod-bound condition in brome.
2.	Alfalfa—3 lbs. Brome—4 lbs. Kentucky Blue Grass—2 lbs. or Creeping Red Fescue—3 lbs.	Kentucky blue on rich, moist soils; creeping red fescue recommended in drier areas or in light soils.
3.	Brome—6 lbs. Kentucky Blue Grass—2 lbs. Alfalfa—2 lbs. White Dutch Clover—½ lb.	Recommended for pasture under irrigation. Blue grass will dominate the mixture in a few years.

Recommended for Pasture or Hay

1.	Alfalfa—2 lbs. Brome—3 lbs. Crested Wheat—3 lbs.	Recommended for drier areas. Brome might be omitted from the mixture and the quantity of crested wheat doubled.
2.	Alsike—2 lbs. Reed Canary Grass—2 lbs. Red Top—2 lbs.	Suited to wet locations subject to flooding.

Recommended for Hay

1.	Alfalfa—6 lbs. Brome—4 lbs.	Same adaptability as No. 1 pasture mixture. In seeding for hay it is possible to include a greater proportion of the legume, since there is little danger of the hay causing bloating in live stock.

2.	Alfalfa—6 lbs. Timothy—3 lbs.	Timothy is sometimes preferred to Brome in rotations because it is more easily eradicated. This mixture is recommended where moisture conditions are good. Red or Alsike clover may form part of the legume.
3.	Red Clover—4 lbs. (Altaswede) Brome—3 lbs. Timothy—2 lbs.	On grey-wood soils, or black soils well supplied with moisture.
4.	Alsike—2 lbs. Timothy—2 lbs. Brome, 4 lbs.	In wet locations subject to flooding. If very wet discard brome and add 1 lb. to rate of seeding each of alsike and timothy, or add 2 lbs. red top.

Mixtures are recommended that consist of one or more grasses and legumes. Alfalfa and brome which form the base of a widely grown mixture, have similar habits with regard to moisture conditions and general adaptation. To meet special conditions or variability in a field, other species may be added. In areas that receive limited rainfall, the brome might be reduced, and crested wheat grass added; while in the moister parts of the Province, a number of grasses and legumes will increase the value of the mixture. Note especially that in the grey-wooded areas, a mixture for hay should include red clover (Altaswede). In fact, in the areas to which it is adapted red clover might supplant alfalfa entirely in short rotations.

The second type of mixture which should be mentioned consists of alsike clover and timothy. This mixture is adapted where abundance of moisture and cool temperatures prevail and on lands subject to flooding. As in the case of alfalfa and brome mixtures the addition of other similarly adapted species may increase the quantity and value of forage produced.

Up to four pounds of sweet clover might be added in some districts and the quantity of seed of other species only slightly reduced. Since sweet clover is a biennial, it will disappear after the second year unless allowed to re-seed. It is particularly useful on land containing too much alkali to permit the production of alfalfa. Slender wheat grass and sweet clover will frequently improve the soil sufficiently to permit the production of more desirable species that are less resistant to alkali.

Finally it should be pointed out that in practice the availability and price of seed will determine to some extent the forage species which shall be included in a mixture. If high yields of good forage are to be obtained, however, the use of grasses and legumes that are adapted and associate well together should be selected. This is especially important when the field seeded down is to be left in permanent hay or pasture. The aim should be to utilize to the best advantage the land which is devoted to the production of these crops.

Seeding Forage Crops

Success or failure in securing satisfactory stands of grasses and legumes is determined largely by the treatment given in the first year.

It should be emphasized that care in the preparation of the soil, seeding, etc., is doubly important when seeding a crop that is to be maintained in the production of forage for a number of years. Alfalfa is usually left down as long as it can be maintained in a productive state. In addition the price of alfalfa seed is relatively high. For these

reasons the failure of an attempt to establish a good stand will result in considerable loss. Carelessness with respect to any farm practice should not be invited, but extreme care may not be warranted when seeding a short rotation crop such as sweet clover, the seed of which is cheap.

Preparation of the Soil

Shallow seeding in well firmed soil is important if satisfactory stands of grasses and legumes are to be secured. Prepare the soil, whether summer fallow or stubble, by shallow cultivation, and then pack. Under no circumstances should cultivation be deep immediately before seeding.

Should the land be heavily infested with perennial weeds, it is advisable to summer fallow a full year previous to seeding. Seeding into clean stubble is satisfactory, provided conditions are such as to permit of a seed bed by cultivating shallow. Indeed, stubble seeding is recommended in areas subject to soil drifting, since trash left on the surface will protect the young seedlings against the wind and drifting soil particles.

Time of Seeding

There is a wide range in the time at which forage seeds may be planted. In the south it is important that spring seeding be done early, especially in the case of crested wheat grass. Good stands of grasses are also secured in this area by seeding during the first two weeks in September or immediately before freeze-up. In areas of greater rainfall, as in the black and wooded soil zones, spring seeding may be delayed, with safety in most years, until the middle of June.

Do not seed in the spring or early fall unless there is sufficient moisture at the depth of planting to germinate the seed. It is better to keep the seed in the sack than to sow in loose, dry soil. Wait until after a good rain, even if it does not come until the first of July, or, if in the south, wait until fall.

Forage crops should not be sown on land infested with cutworms until the worms are fully grown. This is usually not before the middle but may be as late as the end of June.

Method of Seeding

Under most circumstances seeding with a grain drill rather than broadcasting is recommended. In the south especially, the results from broadcast seeding may be disappointing. However, when drilling in grass or legume seed, care should be taken to sufficiently firm the land to permit shallow seeding.

If available, a grass seeder or fertilizer attachment should be used. Well cleaned crested wheat grass can be seeded alone from the grain box of the drill; but when seeding practically all other grasses and legumes this way, it is preferable to mix the seed with twice its bulk of cracked wheat from which the floury part has been sifted.

When a nurse crop is used, it is advisable to seed the grain first and then immediately drill in the forage crop crosswise. The latter may be planted too deeply if sown with the grain. If grasses and legumes must be seeded at the same time as the grain, they should be broadcast from a seeder attachment behind the drill discs and in front of cover chains.

A cyclone or wheelbarrow seeder will most effectively and evenly distribute forage seed when the operation must be performed by hand.

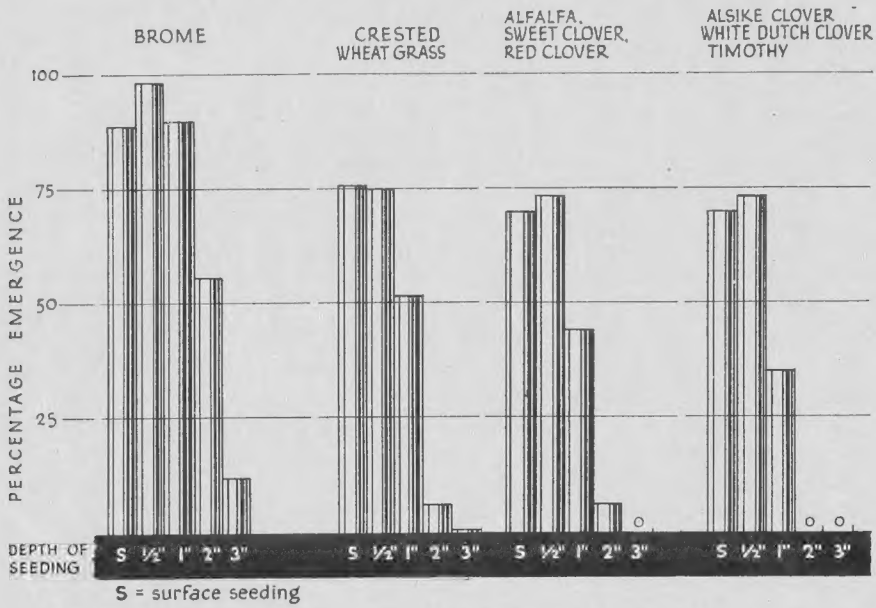
Some method of packing the soil should follow seeding operations. Firmly packing the seeds in the soil close to moisture will ensure good germination. However, on some soils care must be taken lest packing results in baking of the surface and preventing the emergence of seedlings. If the seed is broadcast, a cultipacker will assist to cover the seed as well as pack the soil.

Depth of Seeding

Grasses and legumes must be seeded shallowly if satisfactory stands are to be obtained. This is demonstrated in a chart presented herewith showing the percentage emergence of a number of common forage seeds planted at different depths.

EMERGENCE OF GRASS AND LEGUME SEEDLINGS AT DIFFERENT DEPTHS OF PLANTING

(Emergence of kinds showing similar results averaged)



While large seeds such as brome and slender wheat grass may be seeded about one inch deep, small grass seeds and the legumes should not be seeded more than one-half inch in depth.

Use of a Nurse Crop

On the brown soils and the drier parts of the black soil zone of the Province, grasses and legumes should not be seeded with a nurse crop. The use of a nurse crop in these areas greatly reduces the chance of securing a satisfactory stand.

In areas receiving higher precipitation, a lightly-seeded grain crop might be used to advantage as a nurse crop without greatly endangering the succeeding stand of forage. In deciding upon a nurse crop, however, the kind of forage crop seeded, the use to which it will be put and the price of the seed, should all be given consideration.

If the land is clean, flax is the best of all nurse crops. At the Beaverlodge Experimental Farm, Olli barley has proved a good nurse crop and Hannchen barley a bad one. Oats seeded at the rate of one-

half bushel per acre and cut for green feed is often satisfactory. If threshed grain must be produced, select early varieties and seed at about one-half the usual rate. Cut and remove as early as possible.

Inoculation of Legumes

Legumes increase the nitrogen content of the soil when inoculated with the proper nodule-forming bacteria, which have the power to "fix" nitrogen contained in the air. Legumes cannot obtain nitrogen from the air except through the action of these bacteria and if seeded without them actually draw upon reserve of nitrogen in the soil. No legume should be seeded without inoculation. Cultures are easy to apply and the cost is low.

There are several kinds of legume bacteria each capable of inoculating a special group of legumes. Farmers producing forage crops in Alberta are interested in two of these groups: (1) the alfalfa group which is also used for inoculating white sweet clover and yellow sweet clover; and (2) the red clover group which is capable of inoculating Mammoth and Altaswede red clovers, alsike and white Dutch.

Moist humus inoculating cultures are taking the place of the jelly type cultures formerly used. The humus cultures are effective and convenient to apply. Some of them are "double seeded," that is, they contain two kinds of bacteria; one capable of inoculating the alfalfa group of legumes and the other the red clover group. These combined cultures are a convenience and it is claimed by the manufacturers of the product that good results can be obtained by their use. However, experimental data with respect to their efficiency does not yet seem to be completed.

Use of Commercial Fertilizers

A permanent and successful type of agriculture cannot be established on the grey-wooded soils unless a crop rotation which includes legumes is adopted. However, legumes require sulphur, the supply of which is low in wooded soils but which can be relatively cheaply provided through the addition of sulphur or sulphur containing fertilizer. So important is sulphur in legume production on gray-wooded soils that the yields of forage thereon usually can be more than doubled through the use of this element in some form.

A list of the fertilizers commonly used to supply sulphur on the grey-wood soils, with their sulphur content and usual rate of application is given below.

	Sulphur Content	Recommended rate of application
Flowers of sulphur	98	20
Ammonium Sulphate	24	40
Sodium Sulphate (dry)	22	50
Sodium Sulphate (Hydrated)	11	100
Gypsum	15	60

Ammonium Sulphate is the only carrier of sulphur indicated that can be applied with the ordinary fertilizer attachment—the others must be spread by hand.

Fertilizers applied to forage crops on the brown and black soils in Alberta have not given consistent increases in yields and cannot therefore be generally recommended. Farmers contemplating using fertilizers on these soils, therefore, would be well advised to make preliminary small scale tests on their own farms. This statement, of course, is made with reference only to fertilizers other than barnyard manure.